Small Business Innovation Research/Small Business Tech Transfer

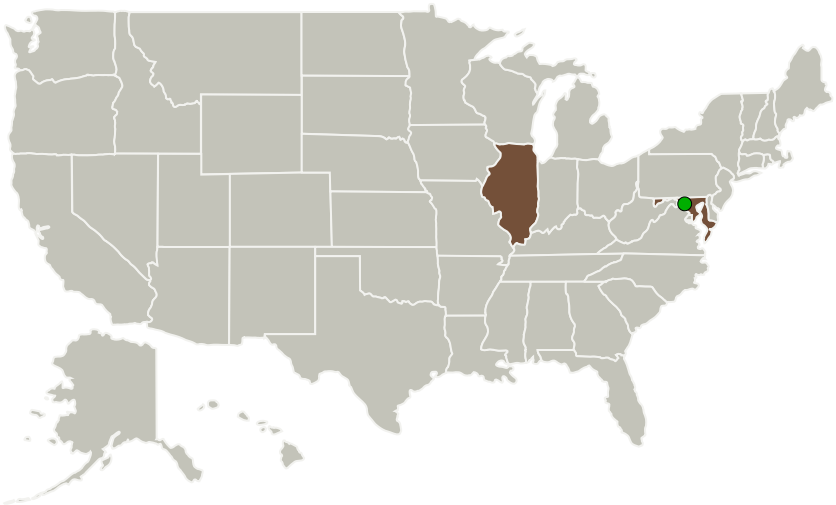
200Gb/s WDM Optical Transceiver Chip Modules with RF Transmission, Quadrature Modulation and Fail-Safe Capabilities, Phase I

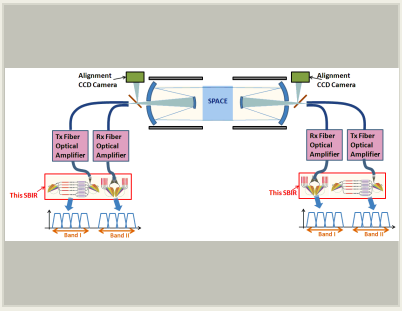
Completed Technology Project (2016 - 2016)

Project Introduction

There have been significant interests from NASA in integrated optical transceiver chips for space optical communications, in particular space-qualifiable 1550nm laser transmitter and receiver with optoelectronic laser, modulator, and detector, that are capable of data rates from 1Gb/sec to 200Gb/sec. The power efficiency shall be better than 10W per Gb/sec and weight less than 100g per Gb/sec. In addition, hybrid RF-optical technologies are sought, and technology based on integrated photonic circuit solution is strongly desired.Operational range of -20°C to +50°C unpowered temperature cycling from -40°C to +40°C are also desired.To address the above mentioned interests, our proposed works will focus on realizing 100-200Gb/sec high-data-rate Wavelength-Division-Multiplexed (WDM) photonic transceiver module with the capability to transmit RF signals on optical beam as well that will be able to meet the above NASA requirements, based on a few key technologies we have developed including: (a) WDM Laser Transmitter with Concurrent Wavelength Locking Capability;(b) Ultra-Compact Wavelength Mux/DeMux; (c) Integrated Narrow Linewidth Laser;(d) Integrated 20-40Gb/sec High-Speed Electro-Optic Modulator with Low-Voltage Capability; (e) Polarization-Insensitive Multi-Mode-Fiber-Capable Integrated 100-200Gb/sec WDM Optical Receiver with Fail-Safe Wavelength and Power Recovery Capabilities; (f) Ruggedized Wide-Temperature-Range Chip Packaging Module.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Optonet, Inc.	Lead Organization	Industry Minority-Owned Business	Evanston, Illinois
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Illinois	Maryland

Project Transitions

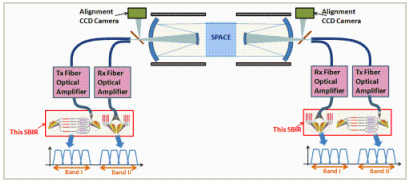
June 2016: Project Start

December 2016: Closed out

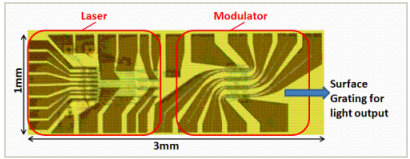
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139595)*

Images



Briefing Chart Image
200Gb/s WDM Optical Transceiver Chip Modules with RF Transmission, Quadrature Modulation and Fail-Safe Capabilities, Phase I *(https://techport.nasa.gov/image/129620)*



Final Summary Chart Image
200Gb/s WDM Optical Transceiver Chip Modules with RF Transmission, Quadrature Modulation and Fail-Safe Capabilities, Phase I Project Image *(https://techport.nasa.gov/image/133435)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Optonet, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

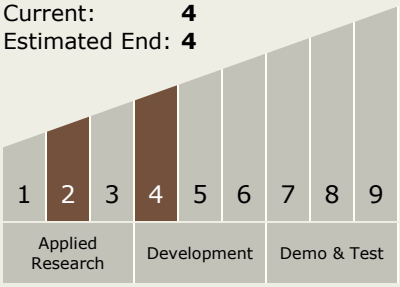
Carlos Torrez

Principal Investigator:

Yingyan Huang

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Completed Technology Project (2016 - 2016)

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.1 Optical Communications
    - TX05.1.6 Optimetrics

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System